

IN THE CLAIMS:

Please cancel Claims 6, 10-12, 15, 18, 33, 37-39, 42 and 45 without prejudice to or disclaimer of the subject matter recited therein.

Please amend Claims 1-5, 7-9, 13, 14, 16, 17, 19-22, 28-32, 34-36, 40, 41, 43, 44, and 46-49 and add Claims 55 and 56 as follows.

1. (Currently Amended) A specific point detecting device for detecting positions of one or more specific points on a target image, comprising:

input means for inputting a target image photographed by first photographing means that is movable;

updating means for updating detection parameters for detecting said specific points, in such a way as to follow changes in how said specific points on said target image are viewed based on an image photographed by second photographing means whose position and orientation are known; and

detecting means for detecting the positions of said specific points on said target image, based on the detection parameters updated by said updating means.

2. (Currently Amended) The device according to claim 1,

~~wherein said target image is a first photographed image photographed by first photographing means that is movable, and~~

said specific points are static specific points in a real space.

3. (Currently Amended) The device according to claim 2, further comprising position/orientation calculation means for calculating a position and orientation of the first photographing means based on the positions of said specific points on said target image, detected by said detecting means.

~~wherein said detecting means further comprises:~~

~~——— first calculating means for calculating the viewpoint position and/or posture of said first photographing means; and~~

~~——— narrowing means for narrowing specific points to be detected, based on the viewpoint position and/or posture calculated by said first calculating means.~~

4. (Currently Amended) The device according to claim 2, wherein a plurality of photographing units are utilized as the first photographing means.

~~wherein there is a plurality of said first photographing means;~~

~~——— said detecting means comprises a plurality of detecting units corresponding respectively to said plurality of first photographing means; and~~

~~——— said plurality of detecting units each detects the positions of said specific points in the first photographed image photographed by corresponding said first photographing means, based on the detection parameters updated by said updating means.~~

5. (Currently Amended) The device according to claim 2, wherein the second photographing means is fixed.

~~wherein said updating means comprises second photographing means in which the position and posture of the viewpoint and the focal distance are fixed; and~~

~~_____generating means for generating said detection parameters, based on a second photographed image photographed by said second photographing means, and~~
~~_____updates current detection parameters to detection parameters generated by said generating means.~~

6. (Cancelled)

7. (Currently Amended) The device according to claim 5, wherein there are comprising a plurality of second photographing means ~~fixed on different viewpoint positions as said second photographing means, and~~

~~wherein said generating updating means generates updates~~ said detection parameters based on ~~such a plurality of second photographed images~~ photographed by the plurality of second photographing means.

8. (Currently Amended) The device according to claim 7,
wherein said plurality of second photographing means photographs one or more specific points in an overlapping manner,

said ~~generating updating means generates updates~~ detection parameters for the same specific point respectively based on photographed images obtained by a plurality of second photographing means, and

said detecting means detects the specific point based on a plurality of detection parameters with respect to the same point.

9. (Currently Amended) The device according to claim 8,

wherein said detecting means ~~comprises viewpoint position calculating means~~
~~for calculating the viewpoint position of said first photographing means, and~~
~~detects the positions of specific points, using~~ uses detection parameters
~~generated~~ updated, by said updating means, based on the image photographed by the first
photographing means. ~~second photographing means nearest to the viewpoint position~~
~~calculated by said viewpoint position calculating means, if there is a plurality of detection parameters corresponding to the same specific~~
~~point.~~

10. (Cancelled)

11. (Cancelled)

12. (Cancelled)

13. (Currently Amended) The device according to claim ~~[[12]]~~ 1,

wherein if there is plurality of detection parameters corresponding to the same
specific point, said detecting means detects the specific point based on each detection
parameter, and a detected position by the detection parameter having the best evaluation
value of detection accuracy is adopted, thereby detecting the position of the specific point.

14. (Currently Amended) The device according to claim [[10]] 1,
wherein said ~~generating~~ updating means comprises supplying means for
supplying the position or area of said specific point on ~~said second photographed the image~~
photographed by the second photographing means, and
extracts a partial image including said specific point from ~~said second~~
~~photographed the image~~ photographed by the second photographing means based on the
position or area supplied by said supplying means, and ~~generates~~ updates said detection
parameters based on the partial image.

15. (Cancelled)

16. (Currently Amended) The device according to claim 14,
wherein said supplying means retains as known information the three-
dimensional position of said specific point and camera parameters of said second
photographing means,
comprises specific point position calculating means for calculating the position
of said specific point on ~~said second photographed the image~~ photographed by the second
photographing means, based on the three-dimensional position of said specific point and
the camera parameters of said second photographing means, and
supplies the position calculated by said specific point position calculating
means.

17. (Currently Amended) The device according to claim 14,
wherein said supplying means comprises feature extracting means for
extracting a featured partial area from ~~said second photographed~~ the image photographed
by the second photographing means, and
supplies the position or area of said featured partial area extracted by said
feature extracting means.

18. (Cancelled)

19. (Currently Amended) The device according to claim ~~[[10]]~~ 1,
wherein said ~~generating~~ updating means ~~generates~~ updates detection
parameters based on a plurality of photographed images photographed at a plurality of
times by said second photographing means.

20. (Currently Amended) The device according to claim ~~[[10]]~~ 1,
wherein said updating means determines timing in which update of detection
parameters is performed, based on the contents of ~~said second photographed~~ the image
photographed by the second photographing means.

21. (Currently Amended) The device according to claim ~~[[20]]~~ 1,
wherein said updating means performs update of detection parameters, if a
degree of difference between a new ~~second photographed~~ image photographed by the
second photographing means and ~~the second photographed~~ an image photographed by the

second photographing means at the time of latest update of detection parameters exceeds a predetermined value.

22. (Currently Amended) The device according to claim 20,
wherein said updating means controls update of detection parameters, based on changes in detection parameters ~~generated~~ updated by said ~~generating~~ updating means.

23. (Original) The device according to claim 1,
wherein said updating means updates detection parameters at a predetermined time interval.

24. (Original) The device according to claim 1,
wherein said updating means comprises storing means for storing two or more kinds of detection parameters prepared in advance for each of said specific points, and
selecting means for selecting a detection parameter for detecting each specific point from two or more kinds of detection parameters stored in said storing means, in such a way as to follow changes in how the specific point is viewed, and

updates current detection parameters to detection parameters selected by said selecting means.

25. (Original) The device according to claim 24,
wherein said selecting means selects detection parameters based on the average intensity value of said target image.

26. (Original) The device according to claim 1,
wherein said detection parameter is a template image including said specific points, and
said detecting means performs template matching for said target image to detect the positions of said specific points on said image.

27. (Original) The device according to claim 1,
wherein said detection parameters are information expressing color and/or intensity unique to said specific points, and
said detecting means extracts areas having the color and/or intensity unique to said specific points from said target image, thereby detecting the positions of said specific points on the image.

28. (Currently Amended) A specific point detecting method of detecting positions of one or more specific points on a target image, comprising:

the inputting step of inputting a target image photographed by first photographing means that is movable;

the updating step of updating detection parameters for detecting said specific points, ~~in such a way as to follow changes in how said specific points on said target image~~

are viewed based on an image photographed by second photographing means whose position and orientation are known; and

the detecting step of detecting the positions of said specific points on said target image, based on the detection parameters updated in said updating step.

29. (Currently Amended) The method according to claim 28,

~~wherein said target image is a first photographed image photographed in a first photographing in a first photographing step by first photographing means that is movable, and~~

said specific points are static specific points in a real space.

30. (Currently Amended) The method according to claim 29, further

comprising a position/orientation calculation step of calculating a position and orientation of the first photographing means based on the positions of said specific points on said target image, detected in said detecting step.

~~wherein said detecting step further comprises:~~

~~———— the first calculating step of calculating the viewpoint position and/or posture of said first photographing means, and~~

~~———— the narrowing step of narrowing specific points to be detected, based on the viewpoint position and/or posture calculated in said first calculating step.~~

31. (Currently Amended) The method according to claim 29, wherein a

plurality of photographing units are utilized as the first photographing means.

~~wherein there is a plurality of said first photographing means, and~~
~~in said detecting step, a plurality of detection processing corresponding~~
~~respectively to said plurality of first photographing means is performed, and~~
~~in each of said plurality of detection processing, the positions of said specific~~
~~points in the first photographed image photographed by corresponding said first~~
~~photographing means are detected, based on the detection parameters updated by said~~
~~updating means.~~

32. (Currently Amended) The method according to claim 29, wherein the
second photographing means is fixed.

~~said updating step comprising:~~

~~the second photographing step of taking photographs by photographing means~~
~~in which the position and posture of the viewpoint and the focal distance are fixed, and~~
~~the generating step of generating said detection parameters, based on a second~~
~~photographed image photographed in said second photographing step are comprised,~~
~~wherein current detection parameters are updated to detection parameters~~
~~generated in said generating step.~~

33. (Cancelled)

34. (Currently Amended) The method according to claim 32, wherein there are

a

wherein in said ~~second photographing step~~, photographs are taken by a plurality of second photographing means ~~fixed on different viewpoint positions~~, and in said ~~generating~~ updating step, said detection parameters are generated, based on ~~such a~~ plurality of ~~second photographed images~~ photographed by the plurality of second photographing means.

35. (Currently Amended) The method according to claim 34, wherein said plurality of second photographing means one or more specific points in an overlapping manner, and in said ~~generating~~ updating step, detection parameters for the same specific point are generated respectively based on photographed images obtained by a plurality of second photographing means, and in said detecting step, the specific point is detected, based on a plurality of detection parameters with respect to the same point.

36. (Currently Amended) The method according to claim 35, said detecting step ~~comprising a viewpoint position calculating step of calculating the viewpoint position of said first photographing means,~~ ~~wherein the position of specific points is detected using~~ uses detection parameters ~~generated~~ updated, in said updating step, based on the image photographed by the second photographing means nearest to the first photographing means. ~~viewpoint position calculated in said viewpoint position calculating step, if there is a plurality of detection parameters corresponding to the same specific point.~~

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Currently Amended) The method according to claim [[39]] 28,
wherein in said detecting step, if there is a plurality of detection parameters
corresponding to the same specific point, the specific point is detected based on each
detection parameter, and a detected position from the detection parameter having the best
evaluation value of detection accuracy is adopted, thereby detecting the position of the
specific point.

41. (Currently Amended) The method according to claim [[37]] 28,
said ~~generating~~ updating step comprising a supplying step of supplying the
position or area of said specific point on ~~said second photographed~~ the image photographed
by the second photographing means, and

wherein a partial image including said specific point is extracted from ~~said~~
~~second photographed~~ the image photographed by the second photographing means based
on the position or area supplied from said supplying step, and updates said detection
parameters are generated based on the partial image.

42. (Cancelled)

43. (Currently Amended) The method according to claim 41,
wherein in said supplying step,
the three-dimensional position of said specific point and camera parameters of
said second photographing means are retained as known information,
the specific point position calculating step of calculating the position of said
specific point on ~~said second photographed~~ the image photographed by the second
photographing means, based on the three-dimensional position of said specific point and
the camera parameters of said second photographing means is comprised, and
the position calculated in said specific point position calculating step is
supplied.

44. (Currently Amended) The method according to claim 41,
wherein ~~in~~ said supplying step ~~[[,]]~~ comprises
the feature extracting step of extracting a featured partial area from ~~said~~
~~second photographed~~ the image photographed by the second photographing means ~~is~~
~~comprised~~, and
the position or area of said featured partial area extracted in said feature
extracting step is supplied.

45. (Cancelled)

46. (Currently Amended) The method according to claim ~~[[37]]~~ 28,
wherein in said ~~generating~~ updating step,

detection parameters are ~~generated~~ updated based on a plurality of photographed images photographed at a plurality of times in said second photographing step.

47. (Currently Amended) The method according to claim ~~[[37]]~~ 28, wherein in said updating step, timing in which update of detection parameters is performed is determined based on the contents of ~~said second photographed~~ the image photographed by the second photographing means.

48. (Currently Amended) The method according to claim ~~[[47]]~~ 28, wherein in said updating step, update of detection parameters is performed, if a degree of difference between a new ~~second photographed~~ image photographed by the second photographing means and ~~the second photographed~~ an image photographed by the second photographing means at the time of latest update of detection parameters exceeds a predetermined value.

49. (Currently Amended) The method according to claim 47, wherein in said updating step, update of detection parameters is controlled, based on changes in detection parameters ~~generated~~ updated in said ~~generating~~ updating step.

50. (Original) The method according to claim 28,
wherein in said updating step, detection parameters are updated at a
predetermined time interval.

51. (Original) The method according to claim 28,
said updating step comprising:
the storing step of storing two or more kinds of detection parameters prepared
in advance for each of said specific points, and
the selecting step of selecting a detection parameter for detecting each specific
point from two or more kinds of detection parameters stored in said storing step, in such a
way as to follow changes in how the specific point is viewed,
wherein current detection parameters are updated to detection parameters
selected in said selecting step.

52. (Original) The method according to claim 51,
wherein in said selecting step, detection parameters are selected based on the
average intensity value of said target image.

53. (Original) The method according to claim 28 wherein said detection
parameter is a template image including said specific points, and
in said detecting step, template matching is performed for said target image to
detect the positions of said specific points.

54. (Original) The method according to claim 28,
wherein said detection parameters are information expressing color and/or
intensity unique to said specific points, and
in said detecting step, areas having the color and/or intensity unique to said
specific points are extracted from said target image, thereby detecting the positions of said
specific points on the image.

55. (New) A computer readable memory which stores a program for making a
computer execute a specific point detecting method of detecting positions of one or more
specific points on a target image, wherein said method comprises:

an input step of inputting a target image photographed by first photographing
means that is movable;

an updating step of updating detection parameters for detecting said specific
points based on an image photographed by second photographing means whose position
and orientation are known; and

a detecting step of detecting the positions of said specific points on said target
image, based on the detection parameters updated in said updating step.

56. (New) A specific point detecting device for detecting positions of one or
more specific points on a target image, comprising:

an input unit configured to input a target image photographed by a first
photographing unit that is movable;

an updating unit configured to update detection parameters for detecting said specific points based on an image photographed by a second photographing unit whose position and orientation are known; and

a detecting unit configured to detect the positions of said specific points on said target image, based on the detection parameters updated by said updating unit.